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Improved Spectral Stability in Spin-Transfer Nano-Oscillators: Single Vortex Versus Coupled Vortices Dynamics

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Abstract

© 2015 IEEE. We perform a comparative study of spin-transfer-induced excitation of the gyrotropic motion of a vortex core with either uniform or vortex spin polarizers. The microwave output voltage associated with the vortex dynamics, detected in both cases, displays a strong reduction of phase fluctuations in the case of the vortex polarizer, with a decrease of the peak linewidth by one order of magnitude down to 200 kHz at zero field. A thorough study of radio frequency emission features for the different accessible vortex configurations shows that this improvement is related to the excitation of coupled vortex dynamics by spin-transfer torques.

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Keywords

Coupled oscillators, Gyrotropic mode, Microwave, Radio frequency, Self-sustained magnetic oscillations, Spin transfer nano-oscillators, Spin transfer torque, Vortex